

### **Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Listing of Claims:**

1. (currently amended)      A diagnostic method, comprising:  
assessing mitochondrial status in a maternal sample, wherein either (a) a mitochondrial deletion associated with altered metabolic activity or (b) a level of mitochondrial membrane potential that is less than a normal baseline value of mitochondrial membrane potential is predictive of a pre-disposition to a chromosomal abnormality associated with Down Syndrome in a fetus.
2. (canceled)
3. (currently amended)      The method of claim 1 ~~or 2~~, wherein the maternal sample is peripheral blood.
4. (currently amended)      The method of claim 1 ~~or 2~~, wherein the maternal sample is isolated from a subject prior to assessment of mitochondrial status.
5. (currently amended)      The method of claim 1 ~~or 2~~, wherein the diagnostic method is performed on a subject prior to conception.
6. (currently amended)      The method of claim 1 ~~or 2~~ wherein the diagnostic method is performed on a subject after conception.
7. (currently amended)      The method of claim 6, wherein said level of mitochondrial membrane potential that is less than a normal baseline value of mitochondrial membrane potential is predictive of said pre-disposition, further comprising performing amniocentesis after assessing the mitochondrial status.

8. (currently amended) The method of claim 2, wherein said level of mitochondrial membrane potential that is less than a normal baseline value of mitochondrial membrane potential is predictive of said pre-disposition, and wherein the mitochondrial status is determined by a quantitative measure of electron potential.

9. The method of claim 8, wherein the quantitative measure is performed using mitotracker red.

10. (currently amended) The method of claim 2, wherein said level of mitochondrial membrane potential that is less than a normal baseline value of mitochondrial membrane potential is predictive of said pre-disposition, and wherein the mitochondrial status is determined by a detection of cell surface molecule expression.

11. The method of claim 10, wherein the cell surface molecule is selected from the group consisting of MHC class I, MHC class II, fas, B71, B72, CD40, fas ligand, and cell surface UCP.

12. (currently amended) The method of claim 1, a mitochondrial deletion associated with altered metabolic activity wherein said level of mitochondrial membrane potential that is less than a normal baseline value of mitochondrial membrane potential is predictive of said pre-disposition wherein the mitochondrial deletion is a deletion in complex I genes of mitochondrial DNA.

13. A method of modifying an oocyte or embryonic cell, comprising:  
microinjecting a heterologous mitochondria into an oocyte or embryonic cell wherein the heterologous mitochondria is capable of achieving at least normal levels of mitochondrial membrane potential in the oocyte or embryonic cell.

14. The method of claim 13, wherein the heterologous mitochondria is microinjected in vitro and the oocyte or embryonic cell is then implanted into a subject.

15. The method of claim 13, wherein the oocyte is derived from a subject determined to have a pre-disposition to a chromosomal abnormality associated with Down Syndrome in a fetus.

16. A modified stem cell, comprising a stem cell having a heterologous mitochondria.

17. The modified stem cell of claim 16 wherein the heterologous mitochondria has a level of mitochondrial membrane potential that is within a normal range relative to a healthy stem cell.

18. A method for promoting tissue generation, comprising subjecting the modified stem cell of claim 14 to growth promoting conditions.

19. The method of claim 18, wherein the modified stem cell is implanted into a subject.

20. The method of claim 19 wherein the modified stem cell is autologous to the subject.

21. The method of claim 18, wherein the stem cell is a neural stem cell.

22. A screening assay, comprising:  
obtaining a biological sample from a subject associated with Down Syndrome, and  
identifying mitochondrial deletion that is present in the biological sample but not in a normal biological sample, wherein the mitochondrial deletion is predictive of Down Syndrome in a fetus of the subject associated with Down Syndrome.

23. The screening assay of claim 22, wherein the subject associated with Down Syndrome is a subject who has carried a fetus known to have a chromosomal abnormality associated with Down Syndrome.

24. The screening assay of claim 22, wherein the mitochondrial deletion is identified using a subtractive hybridization assay.

25. (currently amended) A kit for assessing mitochondrial status in a maternal sample, comprising

a reagent for detecting either (a) a mitochondrial deletion associated with altered metabolic activity, and instructions for utilizing the reagent to identify the deletion or (b) a level of mitochondrial membrane potential and instructions for utilizing the reagent to identify the level of mitochondrial membrane potential, as a predictor of a pre-disposition to a chromosomal abnormality associated with Down Syndrome in a fetus.

26. - 30. (canceled)

31. A neural stem cell having an isolated UCP4 gene under the control of a promoter.

32. The neural stem cell of claim 31, further comprising an isolated UCP2 gene under the control of a promoter.

33. A neural stem cell having an isolated UCP2 gene under the control of a promoter.

34 -35. (canceled)

36. A method of generating neural tissue comprising implanting a neural stem cell of claim 32 into a subject, inducing expression of the UCP2 gene to grow neural tissue, and inducing expression of the UCP4 gene to differentiate the neural stem cells into neural tissue.

37. A modified oocyte or embryonic cell, comprising:

an oocyte or embryonic cell having a microinjected heterologous mitochondria.

38. (canceled)